LECTURE 4

MICROECONOMIC THEORY
CONSUMER THEORY

Consumer Welfare

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USING CONSUMER THEORY

- Consumer analysis is not just a matter of consumers' reactions to prices.
- We pick up the effect of prices on incomes on attainable utility - consumer's welfare.
- This is useful in the design of economic policy, for example.
  - The tax structure?
- We can use a number of tools that have become standard in applied microeconomics
  - price indices?

OVERVIEW...

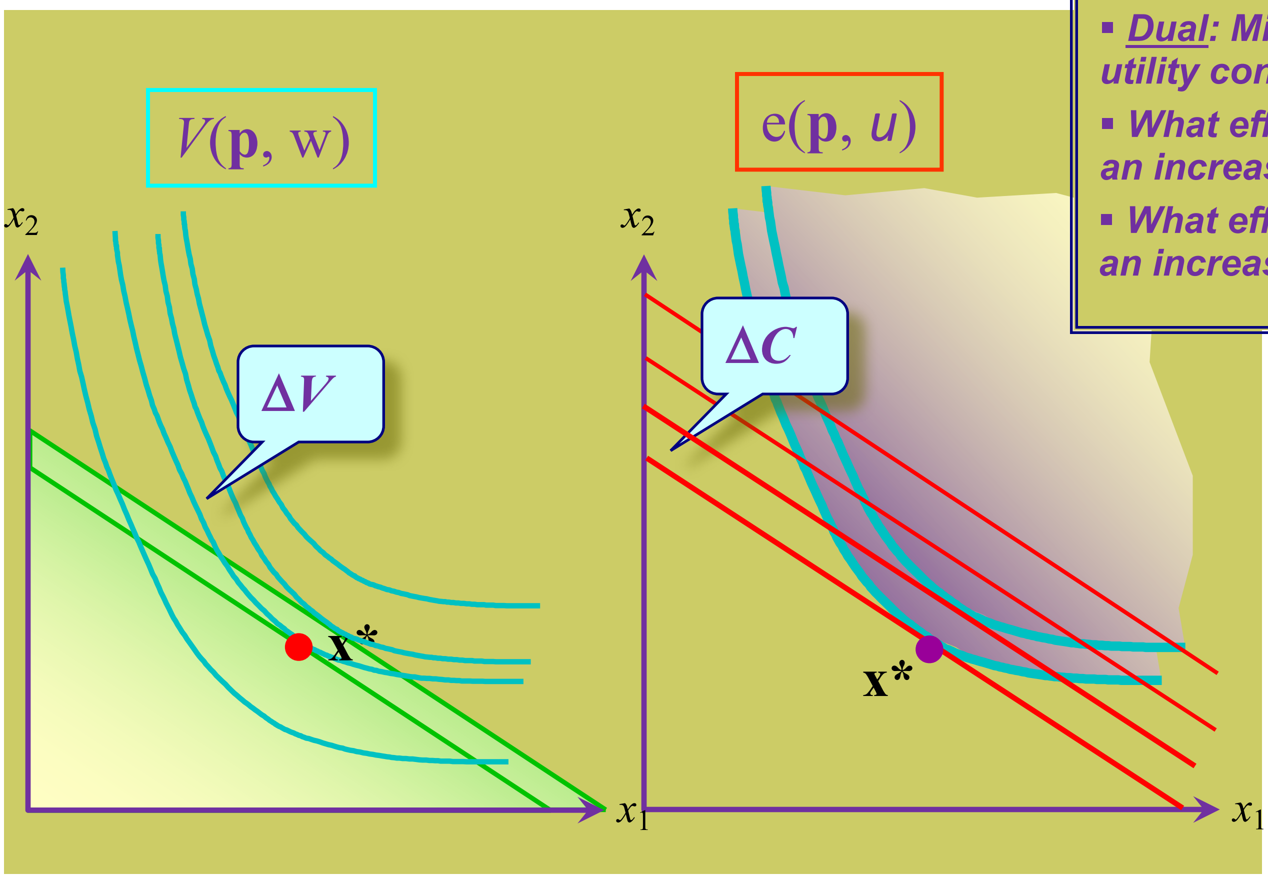
- Consumer welfare
  - Utility and income
  - CV and EV
  - Consumer's surplus

Interpreting the outcome of the optimisation in problem in welfare terms

HOW TO MEASURE A PERSON'S "WELFARE"?

- We could use some concepts that we already have.
- Assume that people know what's best for them...
- ...So that the preference map can be used as a guide.
- We need to look more closely at the concept of "maximised utility"...
- ...the indirect utility function again.

THE TWO ASPECTS OF THE PROBLEM



- *Primal: Max utility subject to the budget constraint*
- *Dual: Min cost subject to a utility constraint*
- *What effect on max-utility of an increase in budget?*
- *What effect on min-cost of an increase in target utility?*

Interpretation of Lagrange multipliers

UTILITY AND INCOME: SUMMARY

- This gives us a framework for the evaluation of marginal changes of income…
- …and an interpretation of the Lagrange multipliers
- The Lagrange multiplier on the income constraint (primal problem) is the marginal utility of income.
- The Lagrange multiplier on the utility constraint (dual problem) is the marginal cost of utility.
- But does this give us all we need?

UTILITY AND INCOME: LIMITATIONS

- This gives us some useful insights but is limited:

1. We have focused only on marginal effects
   - infinitesimal income changes.
2. We have dealt only with income
   - not the effect of changes in prices

- We need a general method of characterising the impact of budget changes:
  - valid for arbitrary price changes
  - easily interpretable
- For the essence of the problem re-examine the basic diagram.

OVERVIEW...

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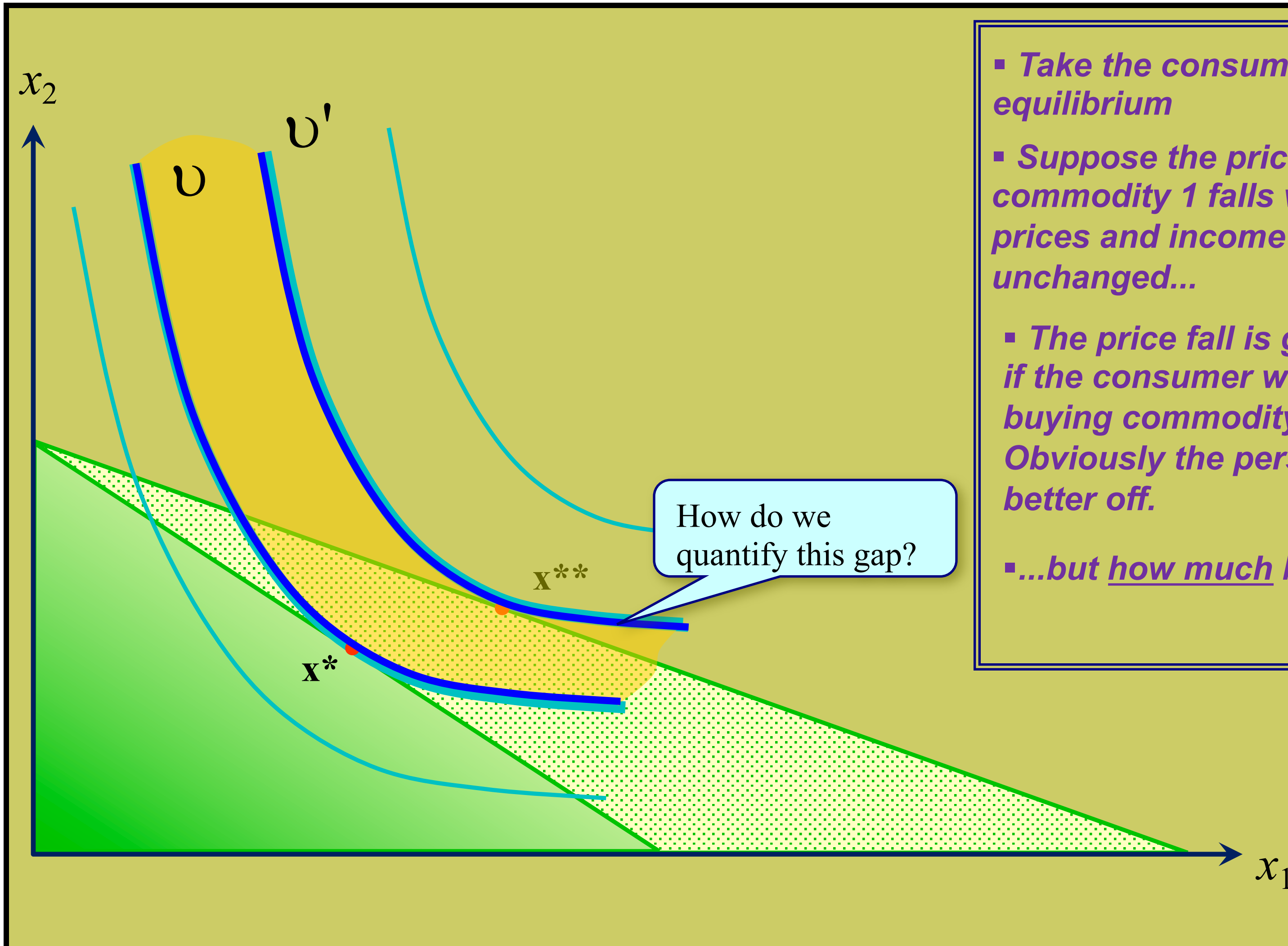
Exact money measures of welfare

THE PROBLEM…



- *Take the consumer's equilibrium*
- *Suppose the price of commodity 1 falls while other prices and income remain unchanged…*
  - *The price fall is good news if the consumer was actually buying commodity 1. Obviously the person is better off.*
  - *…but how much better off?*

APPROACHES TO VALUING UTILITY CHANGE

- Three t… are not much use:

Utility differences

Utility ratios

some distance function

1. $\upsilon' -$ … — depends on the **units** of the *U* function
- υ … — depends on the **origin** of the *U* function
1. $d(\upsilon', \upsilon)$ — depends on the **cardinalisation** of the *U* function

- A more productive idea:
  - *Use income not utility as a measuring rod*
  1. *To do the transformation we use the V function*
  2. *We can do this in (at least) two ways...*

STORY NUMBER 1

- Suppose **p** is the original price vector and **p'** is vector after good 1 becomes cheaper.
- This causes utility to rise from υ to υ'.
  - $\upsilon = v(\mathbf{p}, w)$
  - $\upsilon' = v(\mathbf{p}', w)$
- Express this rise in money terms?
  - What hypothetical change in income would bring the person back to the starting point?
  - (and is this the right question to ask...?)
- Gives us a standard definition....

IN THIS VERSION OF THE STORY WE GET THE *COMPENSATING VARIATION*

$$\upsilon = V(\mathbf{p}, w)$$

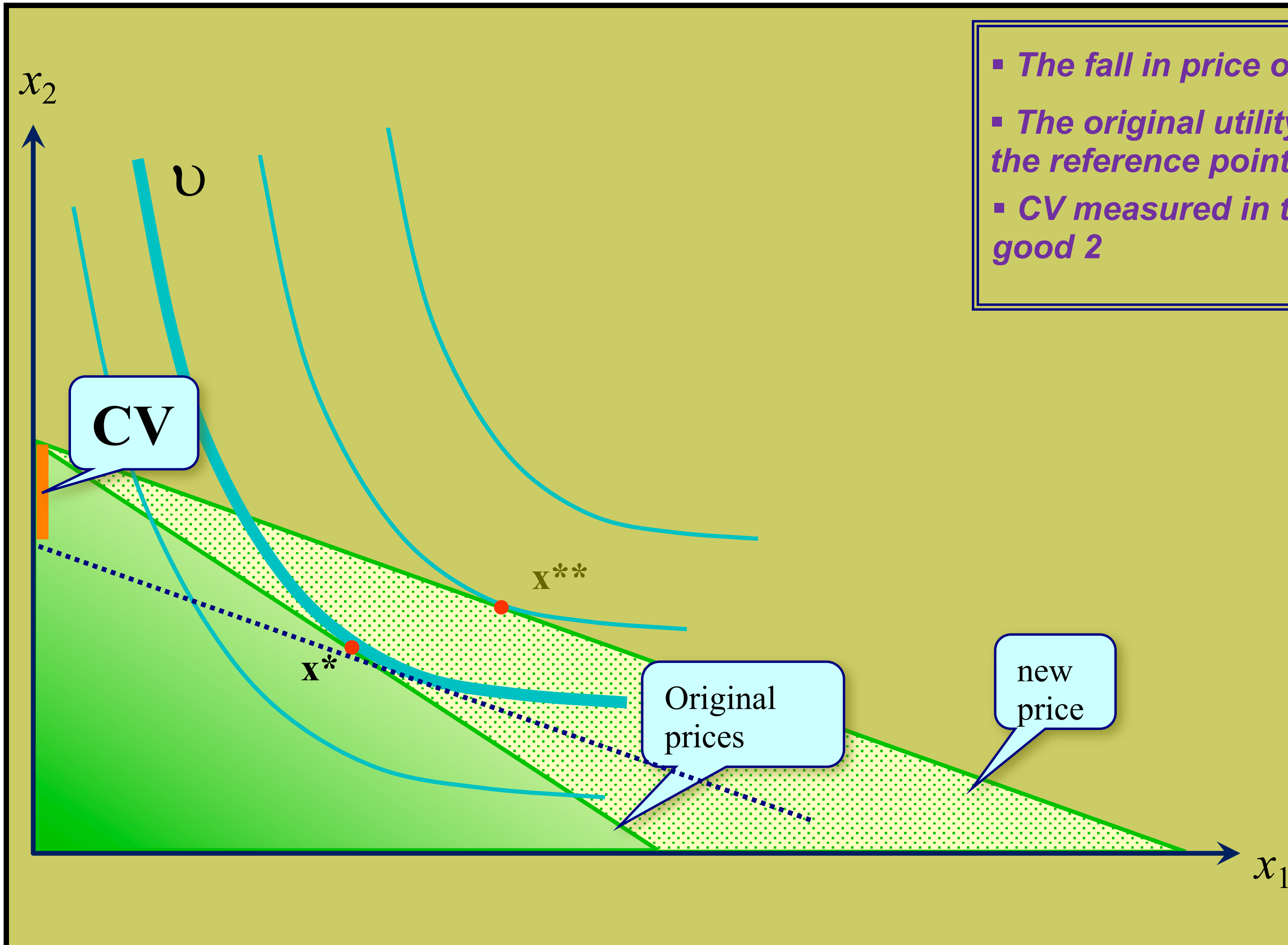
the original utility level at prices **p** and income *w*

$$\upsilon = V(\mathbf{p}', w - \text{CV})$$

the original utility level restored at new prices **p'**

- *The amount CV is just sufficient to "undo" the effect of going from **p** to **p'**.*

THE COMPENSATING VARIATION



- *The fall in price of good 1*
- *The original utility level is the reference point.*
- *CV measured in terms of good 2*

CV – ASSESSMENT

- The CV gives us a clear and interpretable measure of welfare change.
- It values the change in terms of money (or goods).
- But the approach is based on one specific reference point.
- The assumption that the "right" thing to do is to use the original utility level.
- There are alternative assumptions we might reasonably make. For instance...

HERE'S STORY NUMBER 2

- Again suppose:
  - **p** is the original price vector
  - **p**' is the price vector after good 1 becomes cheaper.
- This again causes utility to rise from υ to υ'.
- But now, ask ourselves a different question:
  - Suppose the price fall had never happened
  - What hypothetical change in income would have been needed …
  - …to bring the person to the *new* utility level?

IN THIS VERSION OF THE STORY WE GET THE *EQUIVALENT VARIATION*

$$\upsilon' = v(\mathbf{p}', w)$$

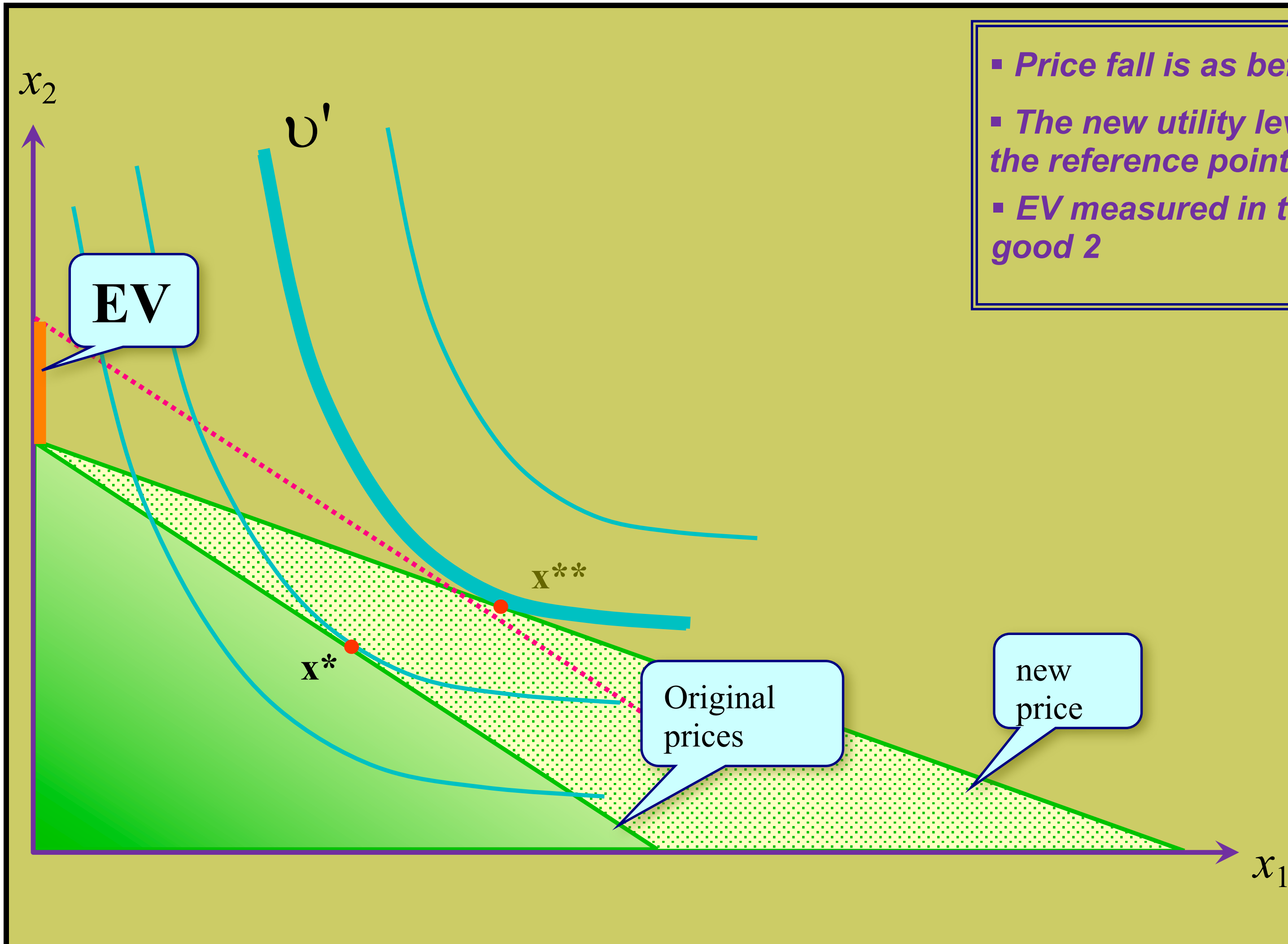
the utility level at new prices **p'** and income *w*

$$\upsilon' = v(\mathbf{p}, w + \text{EV})$$

the new utility level reached at original prices **p**

- *The amount EV is just sufficient to "mimic" the effect of going from **p** to **p'**.*

THE EQUIVALENT VARIATION



- *Price fall is as before.*
- *The new utility level is now the reference point*
- *EV measured in terms of good 2*

OVERVIEW...

A simple, practical approach?

- Consumer welfare
  - Utility and income
  - CV and EV
  - **Consumer's surplus**

ANOTHER (… VA … ORM FOR CV

Prices before

Pr… after

Reference utility level

- Use the cost-differ… ce definit…

$$CV(\mathbf{p}\rightarrow\mathbf{p}') = C(\mathbf{p}, \upsilon) - C(\mathbf{p}', \upsilon)$$

(–) change in cost of hitting utility level υ. If positive we have a welfare *increase*.

- Assume that the price of good 1 changes from p_1 to $p_1{}'$ while other prices remain unchanged. Then we can rewrite the above as:

(Just using the definition of a definite integral)

Hicksian (compensated) demand for good 1

- Further rewrite as:

$$CV(\mathbf{p}\rightarrow\mathbf{p}') = \int_{p_1{}'}^{p_1} H^1(\mathbf{p}, \upsilon)\, \mathrm{d}p_1$$

You're right. It's using Shephard’s lemma again

So CV can be seen as an area under the compensated demand curve

ANOTHER (EQUIVALENT) FORM FOR CV

Prices before

Prices after

Reference utility level

- Use the cost-difference definition

$$\mathrm{CV}(\mathbf{p}\rightarrow\mathbf{p}') = C(\mathbf{p}, \upsilon) - C(\mathbf{p}', \upsilon)$$

(–) change in cost of hitting utility level υ. If positive we have a welfare *increase*.

- Assume that the price of good 1 changes from p_1 to p_1' while other prices remain unchanged. Then we can rewrite the above as:

(the CV can be found by integrating the cost function over a sequence of small changes in prices from **p** to **p'**)

$$\mathrm{CV}(\mathbf{p}\rightarrow\mathbf{p}') = \int_{p_1'}^{p_1} dC$$

Hicksian (compensated) demand for good 1

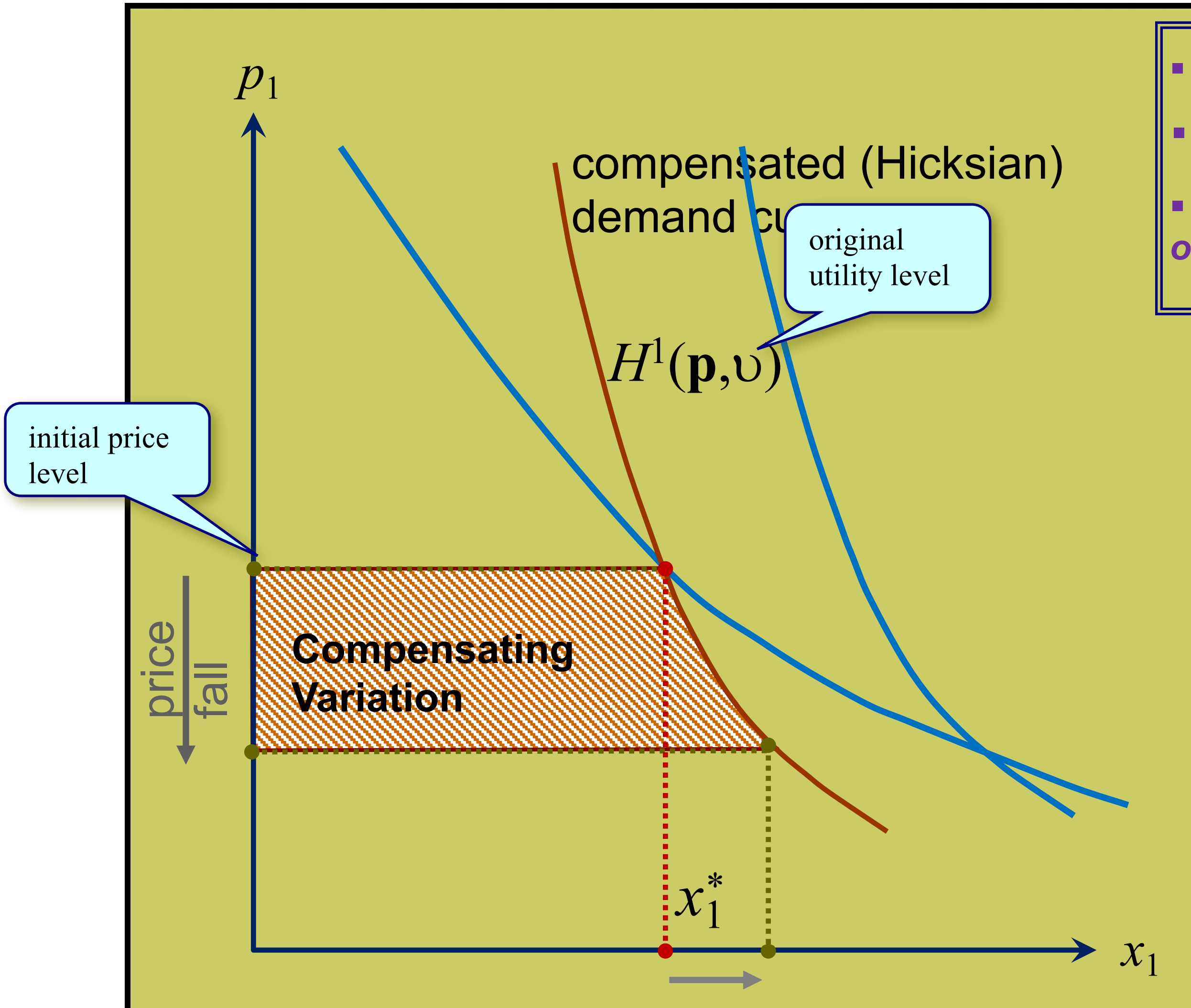
- Further rewrite as:

$$\mathrm{CV}(\mathbf{p}\rightarrow\mathbf{p}') = \int_{p_1'}^{p_1} H^1(\mathbf{p}, \upsilon)\, \mathrm{d}p_1$$

You're right. It's using Shephard's lemma again

So CV can be seen as an area under the compensated demand curve

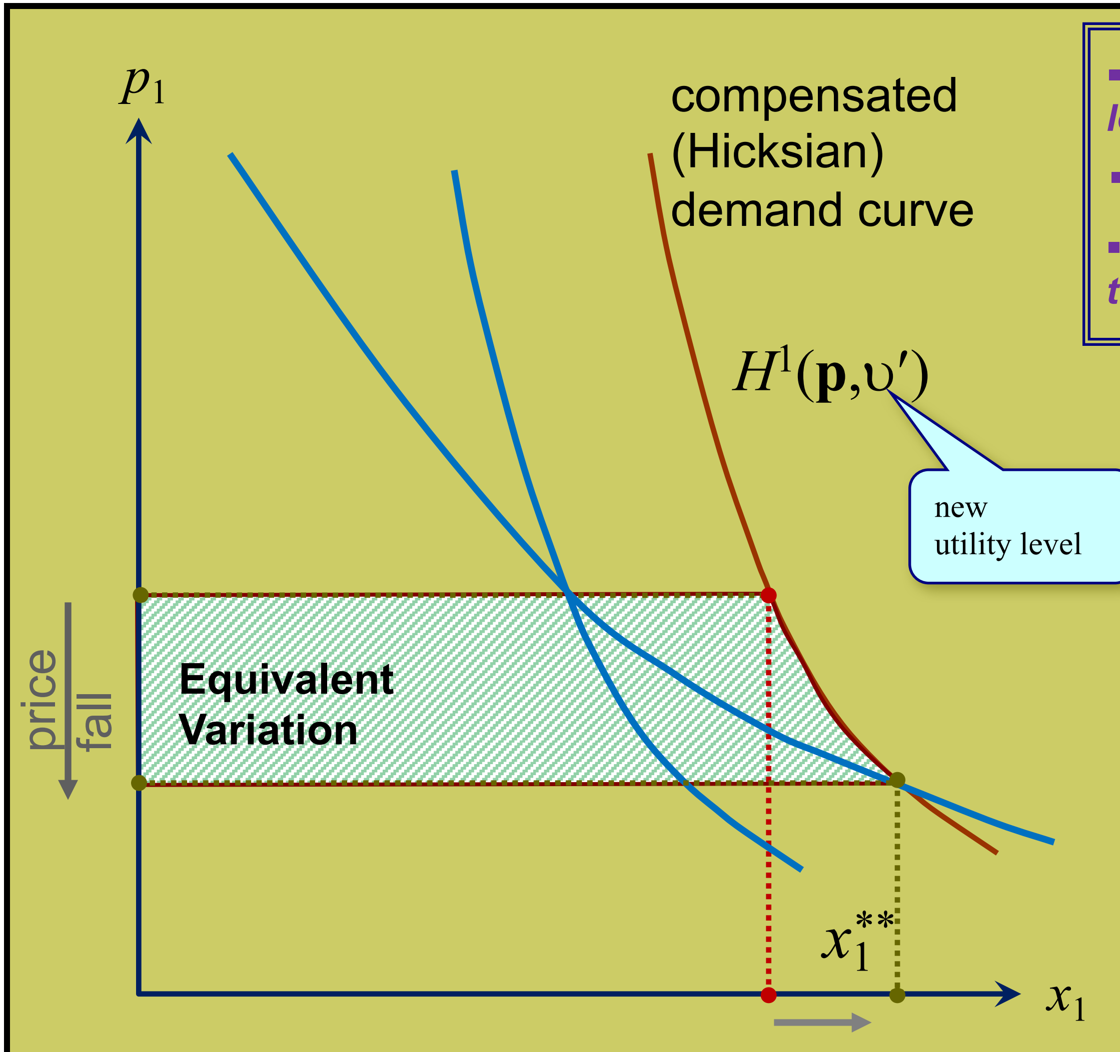
COMPENSATED DEMAND AND THE VALUE OF A PRICE FALL



- *The initial equilibrium*
- *price fall: (welfare increase)*
- *value of price fall, relative to original utility level*

- *The CV provides an exact welfare measure.*
- *But it's not the only approach*

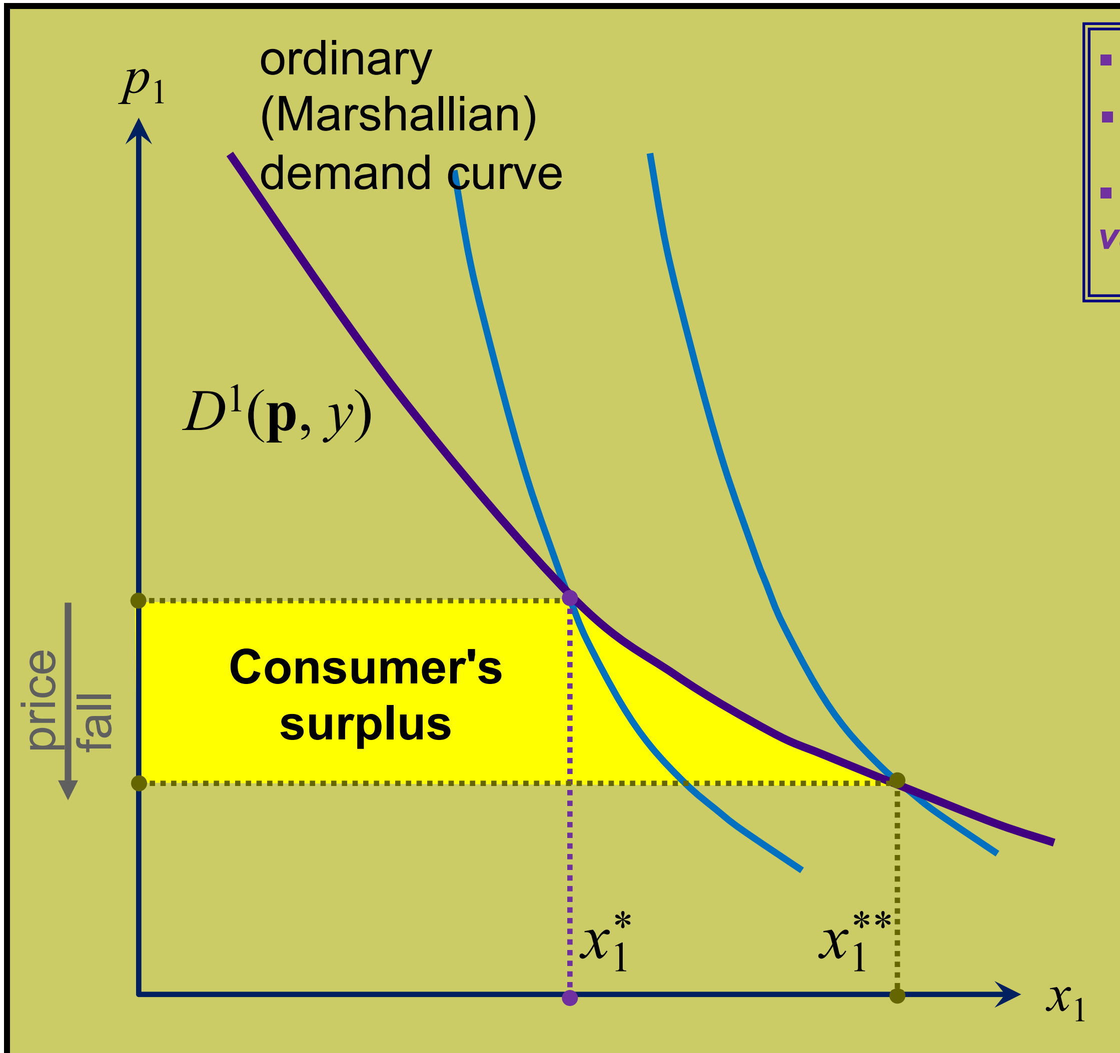
COMPENSATED DEMAND AND THE VALUE OF A PRICE FALL (2)



- *As before but use new utility level as a reference point*
- *price fall: (welfare increase)*
- *value of price fall, relative to new utility level*

- *The EV provides another exact welfare measure.*
- *But based on a different reference point*
- *Other possibilities…*

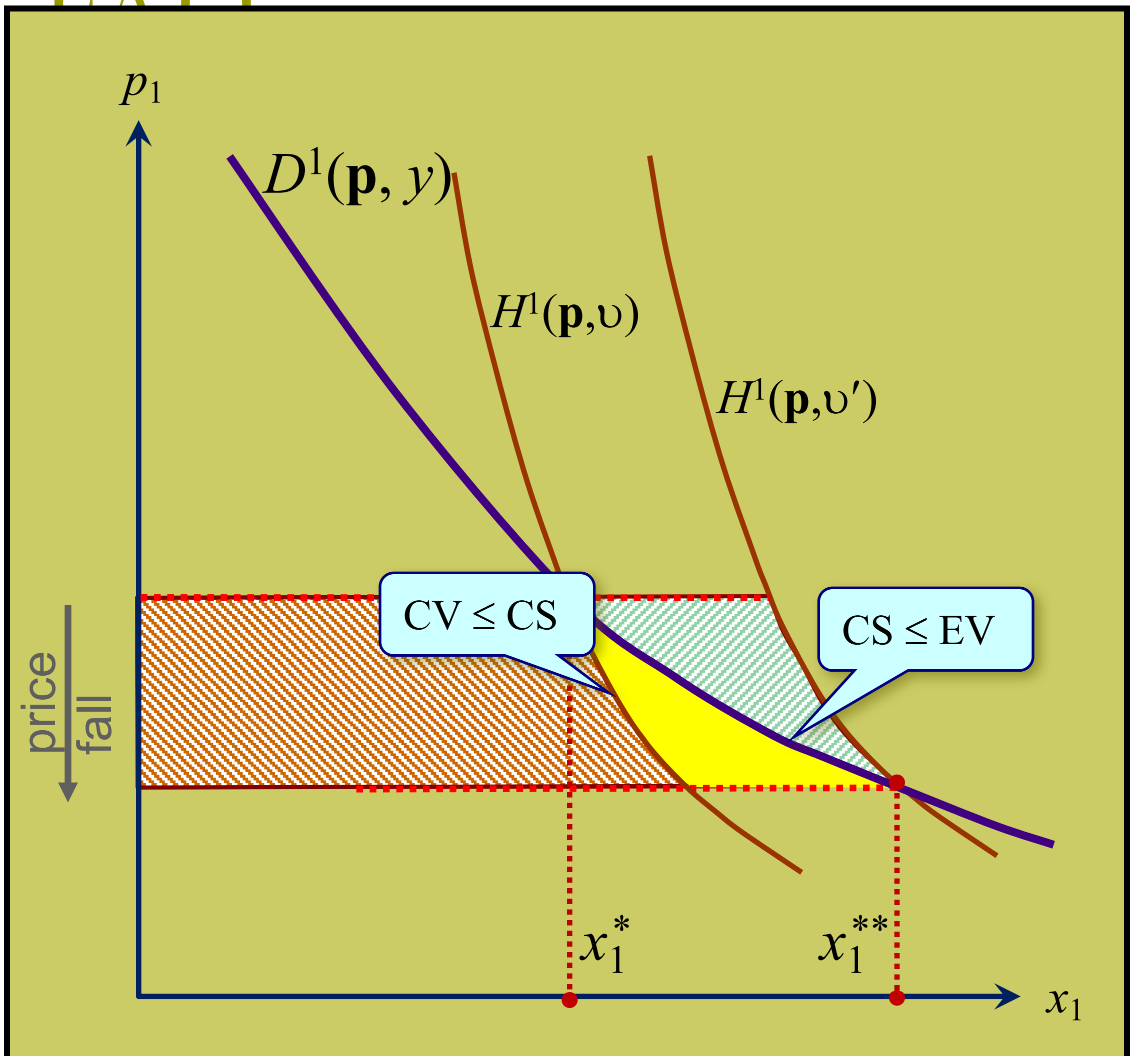
ORDINARY DEMAND AND THE VALUE OF A PRICE FALL



- *The initial equilibrium*
- *price fall: (welfare increase)*
- *An alternative method of valuing the price fall?*

- *CS provides an <u>approximate</u> welfare measure.*

THREE WAYS OF MEASURING THE BENEFITS OF A PRICE FALL



- *Summary of the three approaches.*
- *Conditions for <u>normal</u> goods*
- *So, for normal goods:*

CV ≤ CS ≤ EV

- *For inferior goods:*

CV >CS >EV

SUMMARY: KEY CONCEPTS

- Interpretation of Lagrange multiplier
- Compensating variation
- Equivalent variation
  - CV and EV are measured in monetary units.
- Consumer's surplus
  - The CS is a convenient approximation
  - For normal goods: CV $\leq$ CS $\leq$ EV.
  - For inferior goods: CV $>$ CS $>$ EV.